

Conceptually AP214 and AP224 are very close in defining features. Most of the differences are very minor:

- 1) one AP defines attributes as optional, the other makes them mandatory
- 2) one AP will use a string like ‘sweep path’ to define an entity attribute, the other will use ‘hole depth’.
- 3) one AP has added or removed some attributes, AP224 has a ‘crest’ attribute for thread, AP224 does not, AP224 has an ‘english or metric’ attribute, and AP214 does not.

There are a few major differences:

- 1) AP214 has 2 features AP224 not found in AP224
- 2) AP224 has 11 features not found in AP214
- 3) AP214 defines features that are an instance of a part, and also a library feature to be placed on a part
- 4) AP224 only defines features that are an instance of a part
- 5) The thread features is mapped completely different in AP224 and AP214. AP214 has added a thread occurrence and a different mechanism for referencing specifications.

In summary these features look a lot alike, but data exchange between them is not compatible. I am not sure what the effort would be to make them compatible.

Profile and path

	AP214	AP224	AP224 comments
circular_closed_profile	subtype of shape_aspect	subtype of shape_aspect	
	5 rules	5 rules	
	all five rules same as AP224		
closed_path_profile	subtype of shape_aspect	subtype of shape_aspect	
	5 rules	5 rules	
	all five rules same as AP224		
ngon_closed_profile	subtype of shape_aspect	subtype of shape_aspect	
	8 rules	7 rules	
	WR4: The implicit representation of an ngon_closed_profile shall contain only representation items in its set of items that have a name of either ‘orientation*’, ‘number of sides*’, ‘circumscribed diameter*’, or ‘corner radius*’	No rule	does not effect interoperability
	WR3: ...shall contain 3 <u>or</u> 4 representation_items	WR3: ...shall contain 4 representation_items	
	WR8: corner radius is <u>optional</u>	WR7: corner radius is <u>not optional</u>	interoperability uncertain if AP214 optional parameter is not present
rectangular_closed_profile	subtype of shape_aspect	subtype of shape_aspect	
	8 rules	7 rules	

	WR4: The implicit representation of an rectangular_closed_profile shall contain only representation items in its set of items that have a name of either 'orientation*', 'length', 'width', 'corner radius'	No rule	does not effect interoperability
	WR3: ...shall contain <u>3 or 4</u> representation_items	WR3: ...shall contain <u>4</u> representation_items	
	WR8: corner radius is <u>optional</u>	WR7: corner radius is <u>not optional</u>	interoperability uncertain if AP214 optional parameter is not present
closed_path_profile	subtype of shape_aspect	subtype of shape_aspect	
	5 rules	5 rules	
	all five rules same as AP224		
partial_circular_profile	subtype of shape_aspect	subtype of shape_aspect	
	6 rules	6 rules	
	all six rules same as AP224		
rounded_u_profile	subtype of shape_aspect	subtype of shape_aspect	
	5 rules	5 rules	
	all five rules same as AP224		
square_u_profile	subtype of shape_aspect	subtype of shape_aspect	
	10 rules	9 rules	
	WR4: The implicit representation of an square_u_profile shall contain only representation items in its set of items that have a name of either 'orientation*', 'width', 'first angle', 'second angle', 'first radius', or 'second radius'	No rule	does not effect interoperability
	WR3: ...shall contain <u>4 or 6</u> representation_items	WR3: ...shall contain <u>6</u> representation_items	
	WR9: first radius is <u>optional</u>	WR6: first radius is <u>not optional</u>	interoperability uncertain if AP214 optional parameter is not present
	WR10: corner radius is <u>optional</u>	WR7: second radius is <u>not optional</u>	interoperability uncertain if AP214 optional parameter is not present
tee_profile	subtype of shape_aspect	subtype of shape_aspect	
	14 rules	13 rules	
	WR4: The implicit representation of an tee_profile shall contain only representation items in its set of items that have a name of either 'orientation*', 'width', 'depth', 'cross bar depth', 'first offset', 'second offset', 'first angle', 'second angle', 'radius'	No rule	does not effect interoperability
	WR3: ...shall contain <u>9 or 10</u> representation_items	WR3: ...shall contain <u>10</u> representation_items	
	WR14: radius is <u>optional</u>	WR13: radius is <u>not optional</u>	interoperability uncertain if AP214 optional parameter is not present

vee_profile	subtype of shape_aspect	subtype of shape_aspect	
	7 rules	7 rules	
	WR4: The implicit representation of an vee_profile shall contain only representation items in its set of items that have a name of either 'orientation*', 'profile angle', tilt angle', 'profile radius'	No rule	does not effect interoperability
	WR3: ...shall contain <u>3 or 4</u> representation_items	WR3: ...shall contain <u>4</u> representation_items	
	WR4: profile radius is <u>optional</u>	WR5: profile radius is <u>not optional</u>	interoperability uncertain if AP214 optional parameter is not present
linear_profile	entity not supported	subtype of shape_aspect	
		5 rules	
path_feature_- component	subtype of shape_aspect	subtype of shape_aspect	
	12 rules	14 rules	
	wr3: ' <u>complex</u> ' path shall <u>not have</u> representation specified by shape_representation_with_parameters	wr3: <u>all paths shall have</u> representation specified by shape_representation_with_parameters wr12: ' <u>complex</u> ' path shall <u>have 1</u> representation specified by representation_item	
	wr4: 'linear', 'partial circular', 'complete circular' paths shall have one representation_item of type placement (<u>omits 'complex'</u>)	wr14: all paths shall have one representation_item of type placement	
	wr12: 'complex' path shall have a path_shape_representation with <u>name = 'geometry'</u> and contains a curve with name = 'path curve'	wr13: 'complex' path shall have a path_shape_representation with name = ' <u>complex</u> '.	
	No rule	wr11: 'linear' path shall have exactly 1 direction_shape_representation as its related_shape_aspect	does not effect interoperability

replicate_feature

	AP214	AP224
pattern_definition	subtype of feature_definition	entity not supported
	3 rules	
replicate_feature	sub type of shape_aspect	sub type of shape_aspect , supertype of circular_pattern , rectangular_pattern , modified_pattern , feature_pattern
	2 rules	1 rule
	WR1: shall be the shape_aspect of the product_definition_shape or a pattern_definition .	No rule
	WR2: shall be referenced by shape_aspect_relationship only if they are of type feature_component_relationship , or shape_defining_relationship	WR1: shall be the relating_shape_aspect in exactly one shape_aspect_relationship of type feature_component_relationship with name = 'pattern basis' and a related_shape_aspect that is either a replicate_feature or machining_feature
circular_pattern	subtype of replicate_feature	subtype of replicate_feature
	5 rules	9 rules
	WR1: shall contain between <u>3</u> and <u>4</u> representation_items	WR4: shall contain exactly <u>4</u> representation_items
	WR2: shall contain <u>at most one</u> representation_items name = 'diameter'	WR5: shall contain <u>exactly one</u> representation_items name = 'diameter'
	no rule	WR1: shall be the related_shape_aspect in more than 3 shape_aspect_relationships
	no rule	WR2: shall be the related_shape_aspect in only feature_component_relationship
	no rule	WR3: shall have exactly one shape_representation_with_parameter
	no rule	WR10: shall have representation_item which is a placement <u>with name='orientation'</u>
rectangular_pattern	subtype of replicate_feature	subtype of replicate_feature
	7 rules	11 rules
	WR3: shall contain exactly <u>4</u> representation_items	WR6: shall contain exactly <u>5</u> representation_items

	no rule	WR1: shall be the related_shape_aspect in more than 3 shape_aspect_relationships
	no rule	WR2: shall be the related_shape_aspect in only feature_component_relationship
	no rule	WR5: shall have exactly one shape_representation_with_parameter
	no rule	WR11: shall have representation_item which is a placement with <u>name='orientation'</u>
modified_pattern	subtype of replicate_feature	subtype of replicate_feature
	2 rules	2 rules
	WR1: shall be the relating_shape_aspect of exactly one shape_aspect_relationship with <u>name = 'base pattern'</u> which shall refer as related_shape_aspect to either a circular_pattern or a rectangular_pattern .	WR1: shall be the relating_shape_aspect of exactly one shape_aspect_relationship which shall refer as related_shape_aspect to either a circular_pattern or a rectangular_pattern with <u>name = 'base pattern'</u> .
pattern_offset_membership	subtype of feature_component_relationship	subtype of feature_component_relationship
	12 rules	12 rules
	all 12 rules same as AP224	
pattern_omit_membership	subtype of feature_component_relationship	subtype of feature_component_relationship
	9 rules	9 rules
	all 9 rules same as AP224	
feature_component_relationship	subtype of shape_aspect_relationship	subtype of shape_aspect_relationship
	0 rules	1 rule
	no rule	WR1: the shape_aspect referenced shall be either a replicate_feature , composite_machining_feature , or transition_feature , or shall be an aspect of shape of a feature_definition or feature_component_definition

Transition features

	AP214	AP224
fillet	sub type of transition_feature	sub type of transition_feature
	6 rules	9 rules
	WR2: 'constant radius' fillet shall contain between <u>1 and 3</u> representation_items	WR2: 'constant radius' fillet shall contain exactly <u>3</u> representation_items
	WR3: The 'constant radius' fillet shall contain only representation items in its set of items that have a name of either 'radius', 'first face offset', 'second face offset'	No rule
	WR5: ...shall contain at <u>most one</u> representation_items	WR4: ...shall contain <u>exactly one</u> representation_items
	WR6: ...shall contain at <u>most one</u> representation_items	WR5: ...shall contain <u>exactly one</u> representation_items
	rule found in transition_feature but has <u>exactly one</u> , and name = ' <u>transition face</u> '	WR6: fillet shall have <u>zero or one</u> face_shape_representations with name = ' <u>fillet face</u> '
	rule found in transition_feature but has <u>exactly one</u>	WR7: fillet shall have <u>zero or one</u> face_shape_representations with name = 'first face shape'
	rule found in transition_feature but has <u>exactly one</u>	WR8: fillet shall have <u>zero or one</u> face_shape_representations with name = 'second face shape'
	No rule	WR9: defines relationship to shape_aspect_relationship for purpose of applying a <u>taper</u> to a fillet
edge_round	sub type of transition_feature	sub type of transition_feature
	6 rules	8 rules
	WR2: 'constant radius' edge_round shall contain between <u>1 and 3</u> representation_items	WR2: 'constant radius' edge_round shall contain <u>exactly 3</u> representation_items
	WR3: The 'constant radius' edge_round shall contain only representation_items in its set of items that have a name of either 'radius', 'first face offset', 'second face offset'	No rule
	WR5: ...shall contain at <u>most one</u> representation_items	WR4: ...shall contain <u>exactly one</u> representation_items
	WR6: ...shall contain at <u>most one</u> representation_items	WR5: ...shall contain <u>exactly one</u> representation_items
	rule found in transition_feature but has <u>exactly one</u> , and name = ' <u>transition face</u> '	WR6: edge_round shall have <u>zero or one</u> face_shape_representations with name = ' <u>edge round face</u> '

	rule found in transition_feature but has <u>exactly one</u>	WR6: edge_round shall have <u>zero or one</u> face_shape_representations with name = 'first face shape'
	rule found in transition_feature but has <u>exactly one</u>	WR7: edge_round shall have <u>zero or one</u> face_shape_representations with name = 'second face shape'
chamfer	sub type of transition_feature	sub type of transition_feature
	??? rules	??? rules
	rule found in transition_feature but has <u>exactly one</u> , and name = ' <u>transition face</u> '	WR8: chamfer shall have <u>zero or one</u> face_shape_representations with name = ' <u>chamfer face</u> '
chamfer_offset	sub type of shape_aspect with name = ' <u>chamfer offset</u> ', or ' <u>chamfer angle</u> '	sub type of shape_aspect with name = ' <u>first offset</u> ' or ' <u>second offset</u> '
	9 rules	8 rules
	WR4: chamfer_offset with name = ' <u>chamfer offset</u> ' shall contain a representation name = 'offset amount'.	WR4: chamfer_offset with name = ' <u>first offset</u> ' shall contain a representation name = 'offset amount'. And WR6: chamfer_offset with name = ' <u>second offset</u> ' contain a representation name = 'offset amount'.
	WR5: chamfer_offset with name = ' <u>chamfer angle</u> ' shall contain a representation name = 'offset angle'.	WR6: chamfer_offset with name = ' <u>second offset</u> ' contain a representation name = 'offset angle'.
	WR6: shall be the related_shape_aspect for at least one feature_component_relationship .	WR8: shall be the related_shape_aspect for at least one feature_component_relationship <u>with the relating shape aspect is a chamfer.</u>
	WR7: chamfer_offset with name = ' <u>chamfer offset</u> ' shall be the related_shape_aspect in a feature_component_relationship with a name = ' <u>first chamfer offset</u> ' or ' <u>second chamfer offset</u> '.	WR5: chamfer_offset with name = ' <u>first offset</u> ' shall be the related_shape_aspect in a feature_component_relationship with a name = ' <u>first chamfer offset</u> '.
	WR8: chamfer_offset with name = ' <u>chamfer angle</u> ' shall be the related_shape_aspect in a feature_component_relationship with a name = ' <u>first chamfer offset</u> ' or ' <u>second chamfer offset</u> '.	WR7: chamfer_offset with name = ' <u>second offset</u> ' shall be the related_shape_aspect in a feature_component_relationship with a name = ' <u>second chamfer offset</u> '.
	WR9: chamfer_offset is used by a round_hole	no rule
transition_feature	sub_type of shape_aspect	sub_type of shape_aspect
	5 rules	1 rule
	WR1: transition_feature shall identify an aspect of shape of a product_definition, compound feature in panel, and compound feature in solid.	WR1: transition_feature shall identify an aspect of shape of a product_definition.

	WR2: transition_feature shall have one face_shape_representations with name = ‘first face shape’	(see chamfer , edge_round or fillet)
	WR3: transition_feature shall have one face_shape_representations with name = ‘second face shape’	(see chamfer , edge_round or fillet)
	WR4: transition_feature shall have one face_shape_representations with name = ‘transition face’	(see chamfer , edge_round or fillet)
	WR5: transition_feature shall be a fillet , edge_round , or chamfer	no rule

Features

	AP214	AP224
marking	entity not supported	subtype of feature_definition
outer_round	entity not supported	subtype of feature_definition
protrusion	entity not supported	subtype of feature_definition
removal_volume	entity not supported	subtype of feature_definition
rounded_end	entity not supported	subtype of feature_definition
spherical_cap	entity not supported	subtype of feature_definition
step	entity not supported	subtype of feature_definition
turned_knurl	entity not supported	subtype of feature_definition
flat_face	entity not supported	subtype of feature_definition
outside_profile	entity not supported	subtype of feature_definition
revolved_profil	entity not supported	subtype of feature_definition
compound_hole	entity not supported	subtype of feature_definition
machined_feature	entity not supported	subtype of feature_definition
placed_feature	sub type of feature_definition	entity not supported
feature_definition	subtype of characterized_object	subtype of characterized_object
	2 rules	2 rules
	shall have representation_item which is a placement <u>with name='orientation'</u>	shall have representation_item which is a placement
instanced_feature	subtype of feature_definition and shape_aspect	subtype of feature_definition and shape_aspect
	1 rule	2 rules
	no rule	WR2: shall lie on the boundary of the part
general_feature	sub type of feature_definition	entity not supported
rib	sub type of feature_definition	entity not supported
boss	sub type of feature_definition	sub type of feature_definition

	10 rules	8 rules
	WR1: a boss is either 'circular', ' <u>general</u> ', or ' <u>rectangular</u> '	WR1: a boss is either 'circular', or ' <u>non-circular</u> '
	WR2: If boss is 'circular' then there shall be a shape_aspect with name = ' <u>boundary</u> ' and description= ' <u>closed profile</u> ' that is the related_shape_aspect in exactly one shape_defining_relationship with a name = ' <u>closed profile usage</u> ' in which the relating_shape_aspect is a circular_closed_profile .	WR4: If boss is 'circular' then there shall be a shape_aspect with description= ' <u>circular profile occurrence</u> ' that is the related_shape_aspect in exactly one shape_defining_relationship with a name = ' <u>profile usage</u> ' in which the relating_shape_aspect is a circular_closed_profile .
	WR3: If boss is 'general' then there shall be a shape_aspect with name = ' <u>boundary</u> ' and description= ' <u>closed profile occurrence</u> ' that is the related_shape_aspect in exactly one feature_component_relationship with a name = ' <u>closed profile usage</u> ' in which the relating_shape_aspect is a closed_path_profile .	WR7: If boss is 'non-circular' then there shall be a shape_aspect description= ' <u>change in boundary</u> ' that is the related_shape_aspect in exactly one feature_component_relationship with a name = ' <u>profile usage</u> ' in which the relating_shape_aspect is a circular_closed_profile , rectangular_closed_profile , ngon_closed_profile , or closed_path_profile .
	WR4: If boss is ' <u>rectangular</u> ' then ...	No rule - Does not have ' <u>rectangular</u> ' boss
	WR5: ...shall contain <u>1 or 2</u> representation_items	WR3: ...shall contain <u>1</u> representation_items
	WR6: ... shall contain only representation_item with name = 'orientation' or 'base radius'.	No rule
	WR7: ... shall contain <u>0 or 1</u> representation_item with name = ' <u>base radius</u> ' of type length_measure_with_unit .	WR3: ... shall contain exactly <u>1</u> representation_item with name = ' <u>fillet radius</u> ' of type length_measure_with_unit .
	WR8: shall be basis shape for exactly one shape_aspect with name = ' <u>sweep path</u> ', and description = ' <u>path feature component</u> '. This shape_aspect shall be the related_shape_aspect in exactly one shape_defining_relationship ...	WR2: shall be basis shape for exactly one shape_aspect with name = ' <u>boss height</u> ', and description = ' <u>path feature component usage</u> '. This shape_aspect shall be the related_shape_aspect in exactly one shape_defining_relationship with name = ' <u>boss height</u> ', ...
	WR9: shall be basis shape for exactly one shape_aspect with name = ' <u>top condition</u> ', and description = 'boss top'.	WR5: shall be basis shape for exactly one shape_aspect with description = 'boss top'.
	WR10: shall be basis shape for exactly one shape_aspect with name = ' <u>taper</u> ', and description = ' <u>taper occurrence</u> '. This shape_aspect shall be the related_shape_aspect in exactly one shape_component_relationship with name = 'taper usage', in which the relating_shape_aspect is a taper .	WR6: shall be basis shape for exactly one shape_aspect with description = ' <u>change in diameter</u> '. This shape_aspect shall may be the related_shape_aspect in exactly one shape_component_relationship with name = 'taper usage', in which the relating_shape_aspect is a taper . And WR8: If boss is 'non-circular then taper has description = ' <u>angle taper</u> '

pocket	subtype of feature_definition	subtype of feature_definition
	10 rules	7 rules
	WR2: If pocket is ‘non-rectangular’ then there shall be a shape_aspect <u>name = ‘boundary’</u> and <u>description= ‘profile occurrence’</u> that is the related_shape_aspect in exactly one shape_defining_relationship with a name = ‘profile usage’ in which the relating_shape_aspect is a circular_closed_profile , rectangular_closed_profile , ngon_closed_profile , or closed_path_profile , square_u_profile , partial_circular_profile , rounded_u_profile , vee_profile , open_path_profile .	WR3: If pocket is ‘non-rectangular’ then there shall be a shape_aspect and <u>description= ‘boundary occurrence’</u> that is the related_shape_aspect in exactly one shape_defining_relationship with a name = ‘profile usage’ in which the relating_shape_aspect is a circular_closed_profile , rectangular_closed_profile , ngon_closed_profile , or closed_path_profile , square_u_profile , partial_circular_profile , rounded_u_profile , vee_profile , open_path_profile <u>description=‘boundary’</u> .
	WR3: If pocket is ‘closed rectangular’ then there shall be a shape_aspect <u>name = ‘boundary’</u> and <u>description= ‘closed profile occurrence’</u> that is the related_shape_aspect in exactly one shape_defining_relationship with a name = ‘profile usage’ in which the relating_shape_aspect is a rectangular_closed_profile .	WR4: If pocket is ‘closed rectangular’ then there shall be a shape_aspect and <u>description= ‘closed boundary occurrence’</u> that is the related_shape_aspect in exactly one shape_defining_relationship with a name = ‘profile usage’ in which the relating_shape_aspect is a rectangular_closed_profile <u>description=‘boundary’</u> .
	WR4: If pocket is ‘open rectangular’ then there shall be a shape_aspect <u>name = ‘boundary’</u> and <u>description= ‘open profile occurrence’</u> that is the related_shape_aspect in exactly one shape_defining_relationship with a name = ‘profile usage’ in which the relating_shape_aspect is a square_u_profile .	WR5: If pocket is ‘open rectangular’ then there shall be a shape_aspect and <u>description= ‘open boundary occurrence’</u> that is the related_shape_aspect in exactly one shape_defining_relationship with a name = ‘profile usage’ in which the relating_shape_aspect is a square_u_profile <u>description=‘boundary’</u> .
	WR5: shall be basis shape for exactly one shape_aspect with name = ‘ <u>sweep path</u> ’, and <u>description = ‘path feature component occurrence’</u> . This shape_aspect shall be the related_shape_aspect in exactly one shape_defining_relationship ...	WR2: shall be basis shape for exactly one shape_aspect with name = ‘ <u>pocket depth</u> ’, and <u>description = ‘path feature component usage’</u> . This shape_aspect shall be the related_shape_aspect in exactly one shape_defining_relationship with <u>name = ‘pocket depth’</u> , ...
	WR6: shall be basis shape for exactly one shape_aspect with name = ‘ <u>bottom condition</u> ’, and <u>description = ‘pocket bottom occurrence’</u> .	WR6: shall be basis shape for exactly one shape_aspect with <u>description = ‘pocket bottom occurrence’</u> .
	WR7:shall be basis shape for exactly one shape_aspect with name = ‘ <u>taper</u> ’, and <u>description = ‘taper occurrence’</u> . This shape_aspect shall be the related_shape_aspect in exactly one shape_component_relationship with name = ‘taper usage’, in which the relating_shape_aspect is a taper .	WR7:shall be basis shape for exactly one shape_aspect with <u>description = ‘change in boundary occurrence’</u> . This shape_aspect shall may be the related_shape_aspect in exactly one shape_component_relationship with name = ‘taper usage’, in which the relating_shape_aspect is a taper <u>with description = ‘angle taper’</u>
	WR8: pocket have exactlybetween 1 and 2 implicit representation_item	no rule

	WR9: 1 implicit representation defines a <u>base_radius</u>	no rule
	WR10: <u>base_radius</u> is a <u>length_measure_with_unit</u>	no rule
round_hole	subtype of feature_definition	subtype of feature_definition
	5 rules	4 rules
	WR1: round_hole shall be a shape_aspect <u>name</u> = 'boundary' and <u>description</u> = 'closed profile occurrence' that is the related_shape_aspect in exactly one shape_defining_relationship with a <u>name</u> = 'profile usage' in which the relating_shape_aspect is a circular_closed_profile .	WR1: round_hole shall be a shape_aspect and <u>description</u> = 'diameter occurrence' that is the related_shape_aspect in exactly one shape_defining_relationship with a <u>name</u> = 'profile usage' in which the relating_shape_aspect is a circular_closed_profile .
	WR2: shall be basis shape for exactly one shape_aspect with <u>name</u> = 'sweep path', and <u>description</u> = 'path feature component occurrence'. This shape_aspect shall be the related_shape_aspect in exactly one shape_defining_relationship ...	WR2: shall be basis shape for exactly one shape_aspect with <u>description</u> = 'hole depth occurrence'. This shape_aspect shall be the related_shape_aspect in exactly one shape_defining_relationship with <u>name</u> = 'hole depth', and <u>description</u> = 'path feature component usage' ...
	WR3: shall be basis shape for exactly one shape_aspect with <u>name</u> = 'bottom condition', and <u>description</u> = 'hole bottom occurrence'.	WR3: shall be basis shape for exactly one shape_aspect with <u>description</u> = 'bottom condition occurrence'.
	WR4: shall be basis shape for exactly one shape_aspect with <u>name</u> = 'taper', and <u>description</u> = 'taper occurrence'. This shape_aspect shall be the related_shape_aspect in exactly one shape_component_relationship with <u>name</u> = 'taper usage', in which the relating_shape_aspect is a taper .	WR4: shall be basis shape for exactly one shape_aspect with <u>description</u> = 'change in diameter occurrence'. This shape_aspect shall may be the related_shape_aspect in exactly one shape_component_relationship with <u>name</u> = 'taper usage', in which the relating_shape_aspect is a taper
	WR5: constraint for round_hole with 'top chamfer'	no rule - does not support chamfer on a hole
slot	subtype of feature_definition	subtype of feature_definition
	5 rules	5 rules
	WR1: slot have exactly 1 implicit representation_item	WR1: slot have exactly 2 implicit representation_item
	WR2: the slot shall be a shape_aspect <u>name</u> = 'sweep shape' and <u>description</u> = 'open profile occurrence' that is the related_shape_aspect in exactly one shape_defining_relationship with a <u>name</u> = 'open profile usage' in which the relating_shape_aspect is a square_u_profile , partial_circular_profile , rounded_u_profile , vee_profile , tee_profile , or open_path_profile .	WR3: slot shall be a shape_aspect and <u>description</u> = 'sweep shape occurrence' that is the related_shape_aspect in exactly one shape_defining_relationship with a <u>name</u> = 'profile usage' in which the relating_shape_aspect is a square_u_profile , partial_circular_profile , rounded_u_profile , vee_profile , tee_profile , or open_path_profile <u>description</u> = 'sweep shape'.
	WR3: shall be basis shape for exactly one shape_aspect with <u>name</u> = 'sweep path', and <u>description</u> = 'path feature component occurrence'. This shape_aspect shall be the related_shape_aspect in exactly one shape_defining_relationship ...	WR4: shall be basis shape for exactly one shape_aspect with <u>description</u> = 'course of travel occurrence'. This shape_aspect shall be the related_shape_aspect in exactly one shape_defining_relationship ...

	WR4: shall be basis shape for <u>exactly one</u> shape_aspect with name = ' <u>end condition at path start</u> ', and <u>description</u> = 'slot end occurrence'. This shape_aspect shall be the related_shape_aspect in exactly one feature_component_relationship with name = 'slot end usage' with the relating_shape_aspect a slot end.	WR5: shall be basis shape for <u>2</u> shape_aspect with <u>description</u> = ' <u>end condition occurrence</u> '. This shape_aspect shall be the related_shape_aspect in exactly one feature_component_relationship with name = 'slot end usage' with the relating_shape_aspect a slot end.
	WR5: shall be basis shape for <u>exactly one</u> shape_aspect with name = ' <u>end condition at path end</u> ', and <u>description</u> = 'slot end occurrence'. This shape_aspect shall be the related_shape_aspect in exactly one feature_component_relationship with name = 'slot end usage' with the relating_shape_aspect a slot end.	No rule
	no rule	WR2: shall have one representation_item which has a measure_representation_item with name = 'depth'
thread	subtype of feature_definition	subtype of feature_definition
	10 rules	11 rules
	WR1: thread have between 8 and 10 implicit representation_item	no rule
	WR2: shall have one representation_item which has a descriptive_representation_item with name = ' <u>inner</u> ' or ' <u>outer</u> '	WR10: shall have one representation_item which has a descriptive_representation_item with name = ' <u>internal</u> ' or ' <u>external</u> '
	WR4: shall have <u>at most one</u> representation_item which has a measure_representation_item with name = 'minor diameter'	WR2: shall have <u>exactly one</u> representation_item which has a measure_representation_item with name = 'minor diameter'
	WR5: shall have <u>at most one</u> representation_item which has a measure_representation_item with name = 'pitch diameter'	WR3: shall have <u>exactly one</u> representation_item which has a measure_representation_item with name = 'pitch diameter'
	WR6: shall have at most one representation_item which has a measure_representation_item with name = 'crest'	no rule
	WR7: shall have at most one representation_item which has a measure_representation_item with name = ' <u>density</u> '	WR6: shall have at most one representation_item which has a ratio_measure_with_units with name = ' <u>number of threads</u> '
	WR9: shall have <u>exactly one</u> representation_item which has a descriptive_representation_item with name = 'form'	WR6: shall have <u>at most one</u> representation_item which has a descriptive_representation_item with name = 'form'
	WR10: shall have <u>at most one</u> representation_item which has a descriptive_representation_item with name = 'hand'	WR10: shall have <u>exactly one</u> representation_item which has a descriptive_representation_item with name = 'hand'
	no rule	WR8: shall have exactly one representation_item which has a descriptive_representation_item with name = 'qualifier'

	no rule	WR9: shall have exactly one representation_item which has a descriptive_representation_item with name = 'english' or 'metric'
thread_occurrence	subtype of shape_aspect	entity not supported
	8 rules	
external_defined_thread	external_defined_thread subtype of feature_definition and externally_defined_item	externally_defined_feature_definition subtype of feature_definition and externally_defined_item
	8 rules	12 rules
	WR1: thread have between <u>5 and 7</u> implicit representation_item	WR1: thread have between <u>1 and 8</u> implicit representation_item
	WR2: shall be referenced by applied_document_reference	WR2: shall be basis for at most 1 shape_aspect with <u>description</u> = 'partial area occurrence'. This shape_aspect shall be the related_shape_aspect in exactly one shape_aspect_relationship with name = 'applied area usage' with the relating_shape_aspect as a applied_area
	no rule	WR3: shall be in the set of items of exactly one feature_based_pp_document_assignment that defines documentation for ...
	WR3: shall have one representation_item which has a descriptive_representation_item with name = ' <u>material side</u> ' and description = ' <u>inner</u> ' or ' <u>outer</u> '	WR6: externally_defined_feature_definition with name = ' <u>thread</u> ', shall have one representation_item which has a descriptive_representation_item with name = ' <u>removal direction</u> ' and description = ' <u>internal</u> ' or ' <u>external</u> '
	WR4: shall have exactly one representation_item which has a measure_representation_item with name = 'major diameter'	WR11: externally_defined_feature_definition with name = ' <u>thread</u> ', shall have exactly one representation_item which has a measure_representation_item with name = 'major diameter'
	WR5: shall have <u>exactly one</u> representation_item which has a measure_representation_item with name = 'density'	WR12: externally_defined_feature_definition with name = ' <u>thread</u> ', shall have <u>at most one</u> representation_item which has a ration_measure_with_units with name = 'number of threads'
	WR6: shall have one representation_item which has a descriptive_representation_item with name = 'fit class'	WR9: externally_defined_feature_definition with name = ' <u>thread</u> ', shall have one representation_item which has a descriptive_representation_item with name = 'fit class'
	WR7: shall have one representation_item which has a descriptive_representation_item with name = 'form'	WR10: externally_defined_feature_definition with name = ' <u>thread</u> ', shall have one representation_item which has a descriptive_representation_item name = 'form'

	WR8: shall have one representation_item which has a descriptive_representation_item with name = 'hand'	WR8: externally_defined_feature_definition with name = 'thread', shall have one representation_item which has a descriptive_representation_item with name = 'hand'
	no rule	WR5: externally_defined_feature_definition with name = 'thread', shall have one representation_item which has a descriptive_representation_item with name = 'english' or 'metric'
	no rule	WR7: externally_defined_feature_definition with name = 'thread', shall have one representation_item which has a descriptive_representation_item with name = 'qualifier'
compound_feature	compound_feature_in_solid subtype of feature_definition	compound_machining_feature subtype of machining_feature
	5 rules	3 rules
	WR1: shall be an instanced_feature and composit_shape_aspect or shall have shape that is exactly one shape_aspect of type composite_shape_aspect	WR1: shall be composite_shape_aspect
	WR3: if the compound_feature_in_solid is of type instance_feature , then it should be related to an instanced_feature , transition_feature , or thread_occurrence . WR4:if the compound_feature_in_solid is not of type instance_feature , then it should be related to an placed_feature , transition_feature , or thread_occurrence .	WR3: compound_machining_feature shall be related to a machining_feature
	WR5: each placed_feature that is related to a compound_feature_in_solid shall have placement defined by....	No rule

Feature components

	AP214	AP224
feature_component_definition	subtype of characterized_object	subtype of characterized_object
	1 rule	1 rule
	rule same as AP224	
boss_top	subtype of shape_aspect	subtype of shape_aspect
	7 rules	9 rules
	WR6: shall be the related_shape_aspect in exactly one shape_component_relationship with name = 'boss top usage', and <u>description = 'top condition at part start' or 'top condition at path end'</u> in which the relating_shape_aspect is a shape_aspect of a boss with a name = 'top condition', and description = 'boss top occurrence'.	WR6: shall be the related_shape_aspect in exactly one shape_component_relationship with name = 'boss top usage' in which the relating_shape_aspect is a shape_aspect of a boss . WR9: shall have one representation_item which has a descriptive_representation_item with name = 'boss top orientation' and description = 'boss start', 'boss end'
	no rule	WR7: boss_top shall have exactly one shape_representation_with_parameter
	no rule	WR8: boss_top shall have exactly 1 implicit representation_item
pocket_bottom	subtype of shape_aspect	subtype of shape_aspect
	11 rules	9 rules
	WR5: if pocket_bottom is 'non-planar' that shall be exactly one face_shape_representation or <u>connected face shape representation</u> with name = 'floor face'	WR3: if pocket_bottom is 'non-planar' that shall be exactly one face_shape_representation
	WR4: shall have one representation_item which has a descriptive_representation_item with name = 'bottom location' and description = 'path start', 'path end'	WR9: shall have one representation_item which has a descriptive_representation_item with name = 'pocket bottom orientation' and description = 'pocket start', 'pocket end'
	WR6: if pocket_bottom is 'non-planar' that shall be exactly one location_shape_orientation	no rule (probably should have this rule)
	WR7: if pocket_bottom is 'non-planar' that shall be exactly one direction_shape_representation	no rule (probably should have this rule)

	WR9: pocket_bottom with <u>description = ‘planar’ or ‘non-planar’</u> shall have exactly one shape_representation_with_parameter	WR4: pocket_bottom shall have exactly one shape_representation_with_parameter
	WR10: ... shall contain <u>0 or 1 representation_item</u> with name = ‘ <u>floor radius</u> ’ of type length_measure_with_unit .	WR7: ... shall contain exactly <u>1 representation_item</u> with name = ‘ <u>radius</u> ’ of type length_measure_with_unit .
	WR11: shall be the related_shape_aspect in exactly one feature_component_relationship with name = ‘pocket bottom usage’, and <u>description = ‘bottom condition at part start’ or ‘bottom condition at path end’</u> in which the relating_shape_aspect is a shape_aspect of a pocket with a <u>name = ‘bottom condition’</u> , and <u>description = ‘pocket bottom occurrence’</u> .	WR8: shall be the related_shape_aspect in exactly one shape_component_relationship with name = ‘pocket bottom usage’ in which the relating_shape_aspect is a shape_aspect of a pocket with <u>description ‘bottom condition occurrence’</u> .
Hole_bottom	subtype of shape_aspect	subtype of shape_aspect
	15 rules	13 rules
	WR2: hole_bottom description = ‘through’, ‘flat’, ‘ <u>flat with chamfer</u> ’, ‘ <u>flat with radius</u> ’, ‘spherical’, and ‘conical’	WR2:hole_bottom description=‘through’, ‘flat’, ‘spherical’, and ‘conical’
	WR3: hole_bottom description= ‘through’, ‘ <u>flat with chamfer</u> ’ shall have 0 representations.	WR3: hole_bottom description= ‘through’, ‘ <u>flat with chamfer</u> ’ shall have 0 representations.
	WR8: hole_bottom <u>description= ‘flat’, ‘flat with radius’, ‘spherical’, and ‘conical’</u> shall have one representation_item which has a descriptive_representation_item with <u>name = ‘bottom location’ and description = ‘path start’, ‘path end’</u>	WR8: shall have one representation_item which has a descriptive_representation_item with <u>name = ‘blind bottom orientation’ and description = ‘hole start’, ‘hole end’</u>
	WR9: constraint for hole_bottom description= ‘flat with radius’ ...	no rule (do not support feature component)
	WR13: constraint for hole_bottom description= ‘flat with chamfer’ ...	no rule (do not support feature component)
	WR14:constraint for hole_bottom description= ‘flat with chamfer’ ...	no rule (do not support feature component)
	WR15: shall be the related_shape_aspect in exactly one feature_component_relationship with name = ‘hole bottom usage’, and <u>description = ‘bottom condition at part start’ or ‘bottom condition at path end’</u> in which the relating_shape_aspect is a shape_aspect of a round_hole with a <u>name = ‘bottom condition’</u> , and <u>description = ‘hole bottom occurrence’</u> .	WR13: shall be the related_shape_aspect in exactly one shape_component_relationship with name = ‘hole bottom usage’ in which the relating_shape_aspect is a shape_aspect of a round_hole with <u>description ‘bottom condition occurrence’</u> .
Slot_end	subtype of shape_aspect	subtype of shape_aspect
	10 rules	10 rules
	first 9 rules same as AP224	

	WR10: shall be the related_shape_aspect in exactly one feature_component_relationship with name = 'slot end usage', and <u>description = 'end condition at part start' or 'end condition at path end'</u> in which the relating_shape_aspect is a shape_aspect of a round_hole with a <u>name = 'end condition'</u> , and description = 'slot end occurrence'.	WR10: shall be the related_shape_aspect in exactly one shape_component_relationship with name = 'slot end usage' in which the relating_shape_aspect is a shape_aspect of a round_hole with <u>description 'end condition occurrence'</u> .
applied_area	entity not supported	subtype of shape_aspect
		5 rules
taper	subtype of shape_aspect	subtype of shape_aspect
	8 rules	6 rules
	WR2: taper description= 'angle taper', 'diameter taper' , ' <u>directed taper</u> '	WR2: taper description= 'angle taper', 'diameter taper'
	WR7: rule applied to taper name = 'directed taper' ...	no rule
	WR8: rule applied to taper name = 'directed taper' ...	no rule